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## **PERFORMANCE TEST OF FOKKER D-VII EQUIPPED WITH PACKARD 1237 ENGINE**

(PERFORMANCE TEST REPORT No. 69)



Prepared by Engineering Division, Air Service  
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# PERFORMANCE TEST OF FOKKER D-VII EQUIPPED WITH PACKARD 1237 ENGINE.

## OFFICIAL PERFORMANCE TEST—SUMMARY OF RESULTS.

AUGUST 31, 1921.

Airplane: Fokker D-VII.

No.: P-195.

Type: I.

Engine: Packard 1237.

Propeller: 24705.

Equipped: Approximately as *Alert*, allowing for extra gas and oil carried.

Weight empty (including water): 1,867 pounds.

Armament and equipment: 70 pounds.

Crew: 180 pounds.

Gasoline: 308 pounds.

Oil: 37 pounds.

Weight loaded: 2,462 pounds.

Weight per square foot: 10.43 pounds.

Weight per horsepower: 7.04 pounds (350 horsepower at 1,975 revolutions per minute).

| Stand-<br>ard alti-<br>tude in<br>feet. | Climb.             |          |                   |                      | Speed.   |          |                      |  |
|---|--------------------|----------|-------------------|----------------------|----------|----------|----------------------|--|
|   | Time<br>in<br>min. | R. p. m. | Rate ft./<br>min. | Flow<br>gal./<br>hr. | M. p. h. | R. p. m. | Flow<br>gal./<br>hr. |  |
| 0                                       | .....              | 1,680    | 1,700             | .....                | 151      | 1,975    | .....                |  |
| 6,500                                   | 4.6                | 1,645    | 1,180             | .....                | 147      | 1,905    | .....                |  |
| 10,000                                  | 8.0                | 1,625    | 895               | .....                | 144.5    | 1,860    | .....                |  |
| 15,000                                  | 15.5               | 1,596    | 490               | .....                | 138.5    | 1,785    | .....                |  |
| 20,000                                  | 37.7               | 1,455    | 80                | .....                | 116.0    | 1,655    | .....                |  |
| 25 000                                  | .....              | .....    | .....             | .....                | .....    | .....    | .....                |  |
| <sup>1</sup> 19,750                     | 34.9               | 1,555    | 100               | .....                | 121.5    | 1,670    | .....                |  |
| <sup>2</sup> 21,000                     | .....              | 1,545    | 0                 | .....                | 91       | 1,545    | .....                |  |

<sup>1</sup> Service ceiling.

<sup>2</sup> Absolute ceiling.

Endurance, full throttle at 10,000 feet (including climb);  
2 hours 13 minutes.

Minimum speed at sea level (lowest throttle), 63 miles  
per hour.

Landing speed, ———.

## PILOT'S OBSERVATIONS ON FOKKER D-VII WITH PACKARD 12 HIGH-COMPRESSION ENGINE.

The flying qualities of the Fokker D-VII equipped with the Packard 12 high-compression engine are of course similar in most respects to airplanes of this type equipped with the standard B. M. W. or Mercedes engines, the most noticeable points of difference being in landing and maneuvering ability.

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Due to the increase in weight this airplane lands with considerably more speed than the standard Fokker, and rolls much further after being on the ground. It is not, however, an especially difficult airplane to land.

The airplane is sensitive on the controls, but is stiffer laterally than the standard Fokker. On the whole it does not maneuver as nicely as the B. M. W. engined airplane, due presumably to the distribution of a greater amount of weight over a longer portion of the fuselage, which appears to have a tendency to hold the airplane in its given course, and to resist any turning moment. The airplane can, however, be maneuvered very quickly and nicely by the application of a greater amount of force on the controls than is required on the standard Fokker.

The airplane is quite tail heavy in level flight wide open near the ground. This tendency disappears rapidly above 10,000 feet, and the airplane is perfectly balanced at an altitude of from 18,000 to 20,000 feet.

The nose radiator cools the engine perfectly. It never overheated on the hottest days, and the shutters were generally required above 10,000 to 12,000 feet in the climb, being fully closed above 17,000 feet in both climb and speed courses.

The general arrangement of the cockpit is good, as far as location of instruments, etc., is concerned. The throttle mixture control, shutters, and gas shut-off valve are all operated by levers and rods giving a very smooth, positive action, and delicate adjustment. They are the most satisfactory set of controls for these devices of any airplane I have ever flown. The placing of the seat and rudder bar is bad, however, making a most uncomfortable seating arrangement which practically paralyzes the pilot's legs and body in a flight of two hours. Also the seat is so constructed that it is impossible to use a parachute with it.

During the entire test the Packard engine ran perfectly, giving no trouble whatever, and requiring no adjustments of any kind. This engine runs with an almost entire absence of vibration at any speed up to 2,000 revolutions per minute. It throttles perfectly and runs smoothly, without any roughness or difficulty in carburation, back-fire, or spitting at any desired speed. It has a remarkably quick and smooth acceleration and appears never to "load up." It is a very easy engine to start, generally starting the first time over.

On the whole from the pilot's standpoint it is a delightful engine to fly and maintain.

MUIR S. FAIRCHILD,

1st Lieut. A. S., Test Pilot.

**DESCRIPTION OF AIRPLANE.****DIMENSIONS.**

Overall span, 27 feet 5½ inches.  
 Overall length, 23 feet.  
 Overall height, 9 feet 3 inches.  
 Height at hub of propeller above ground:  
   In flying position, 5 feet 3 inches.  
   At rest, 6 feet ¾ inch.

**AIRPLANES.**

Wing curve, Fokker varying.  
 Sweepback, none.  
 Dihedral, degrees, upper, 2°; lower, 1° 20'.  
 Stagger, 2 feet 1 inch.  
 Total area including ailerons, 236 square feet.  
 Gap, \_\_\_\_\_.  
 Area of plane between wheels, 11 square feet.

**UPPER PLANE.**

(Including center section.)

Span, 27 feet 5½ inches.  
 Chord, 5 feet 3 inches.  
 Area with ailerons, 145 square feet.  
 Incidence, degrees, none.

**LOWER PLANE.**

Span, 22 feet 11¼ inches.  
 Chord, 3 feet 11¼ inches.  
 Area, 91 square feet.  
 Incidence, degrees, 1° to 1.5°.  
 Gap, 4 feet 6¼ inches.

**AILERONS OR FLAPS.**

Number, 2.  
 Arrangement, upper wing only.  
 Upper length, 7 feet 2½ inches.  
 Upper chord, 7.5 to 12 inches balanced.  
 Upper area, 6.62 square feet.  
 Lower length, \_\_\_\_\_.  
 Lower chord, \_\_\_\_\_.  
 Lower area, \_\_\_\_\_.  
 Total area, 13.24 square feet.  
 Distance from center of ailerons to longitudinal axis of airplane

**CENTER SECTION.**

Area, none.  
 Dimensions, \_\_\_\_\_.  
 Contents, \_\_\_\_\_.

**STABILIZER.**

Area, 20.4 square feet.  
 Setting, fixed not adjustable.

**ELEVATOR.**

Area, 18.4 square feet.  
 Distance from leading edge of elevator to center of gravity of airplane, 16.04 feet.  
 Center of gravity, 3.1 inches to rear of leading edge of lower plane.

**RUDDER.**

Area, 6.8 square feet.  
 Distance from leading edge of rudder to center of gravity of airplane, 16.09 feet.

**FUSELAGE.**

Maximum cross-section shape, rectangular.  
 Maximum cross-section area, 9.35 square feet.  
 Maximum cross-section dimension, 3 feet 9½ inches by 2 feet 5½ inches.  
 Distance of maximum section from leading edge, lower plane, 3 inches.

**LANDING GEAR.**

Number of wheels, 2.  
 Tread, 71 inches.  
 Shock-absorbing system, spiral steel spring.  
 Braking device, tail skid.  
 Wheels ahead of center of gravity, 14 inches.

**FIN.**

Area, 2.9 square feet.

**DISTRIBUTION OF WEIGHTS.**

|                                | Pounds. |
|--------------------------------|---------|
| Weight empty (with water)..... | 1,867   |
| Armament and equipment.....    | 70      |
| Crew.....                      | 180     |
| Gasoline.....                  | 308     |
| Oil.....                       | 37      |

Weight loaded..... 2,462

Weight on front wheels (tail skid on ground)..... 2,218  
 Weight on tail skid (tail skid on ground)..... 244  
 Weight on front wheels (flying position)..... 2,342  
 Weight on tail skid (flying position)..... 120

Center of gravity (distance from wheels in flying position), 9.9 inches.

Center line of wheels to point of support of tail skid, 16 feet.

Provisions for special equipment not carried during test.

**DESCRIPTION OF POWER PLANT.****ENGINE.**

Make, Packard.  
 Factory No., 2.  
 A. S. No., 94602.  
 Type, Vee, 12-cyl.  
 Number in plane, 1.  
 Location, nose of fuselage.  
 Rated horsepower, 300.  
 Rated revolutions per minute, 1,800.  
 Bore, 5-inch.  
 Stroke, 5½-inch.  
 Compression ratio, 5.5 to 1.  
 Weight, dry, 738 pounds.  
 Gas consumption, 0.515.  
 Oil consumption, 4.1 pints per brake horsepower hour.  
 Weight of water in engine, 39 pounds.

**IGNITION.**

Battery or magneto, magneto.  
 Make, Berkshire.  
 Number, 2.  
 Advance, 27°.  
 Gas interrupter, 0.020.  
 Distributor, carbon brush contact.  
 Plugs, make, A. C.  
 Type, metal body, porcelain insulator.  
 Gap, 0.015.



## CARBURETORS.

Make, Zenith.  
 Type, Duplex Packard Zenith, single venturi.  
 Number, 1.  
 Setting jet, 165.  
 Choke, 31 m/m.  
 Compensator, 170.  
 Gas drains, 1.  
 Air intake, led into slipstream below fuselage.  
 Mixture control, Standard.  
 Eff. to Altitude, ———.

## RADIATORS.

Make, Harrison.  
 Type, Honeycomb.  
 Number, 1.  
 Position, nose of fuselage.  
 Frontal area, 5.2 square feet.  
 Core depth, 5 inches.  
 Length, over all, 42 $\frac{3}{4}$  inches.  
 Width, 28 $\frac{3}{4}$  inches.  
 Radiator surface, 260 square feet.  
 Temperature adjustment, shutters.  
 Water capacity, 65 pounds.  
 Flow gallons per minute, satisfactory.  
 Thermometers, make, Boyce, Type C.  
 Weight, 110 pounds.  
 Water capacity of whole system, 110 pounds.

## EXHAUST PIPES.

Description: Short individual stacks to each cylinder.

## LUBRICATION.

Capacity oil tanks, 20 quarts.  
 Dimensions oil tank, ———.  
 Oil used (brand), Liberty.  
 Oil pressure, 60 pounds.  
 Oil temperature, 120°.  
 Type pump, gear.  
 Wet or dry sump, dry sump.  
 If wet, capacity, ———.  
 Description lubrication system, standard.

## FUEL SYSTEM.

Number of tanks, 1.  
 Location, between pilot's seat and engine.  
 Capacity, main, 47.5 gallons.  
 Capacity, reserve pounds, ———.  
 Material, ———.  
 Gauge, ———.  
 Description of fuel supply system, pressure system; air pump on engine forces gasoline to carburetor.

## ENGINE CONTROL.

Description, throttle lever and switch.

## PROPELLER.

Make, Engineering Division.  
 Number blades, 2.  
 Diameter, 8 feet 8 inches.  
 Pitch, 6.41 feet.  
 Tips, terneplate.  
 Clearance, ———.  
 Mfg. No., ———.  
 A. S. No., 108,958.  
 Remarks, X-24705; 01175.

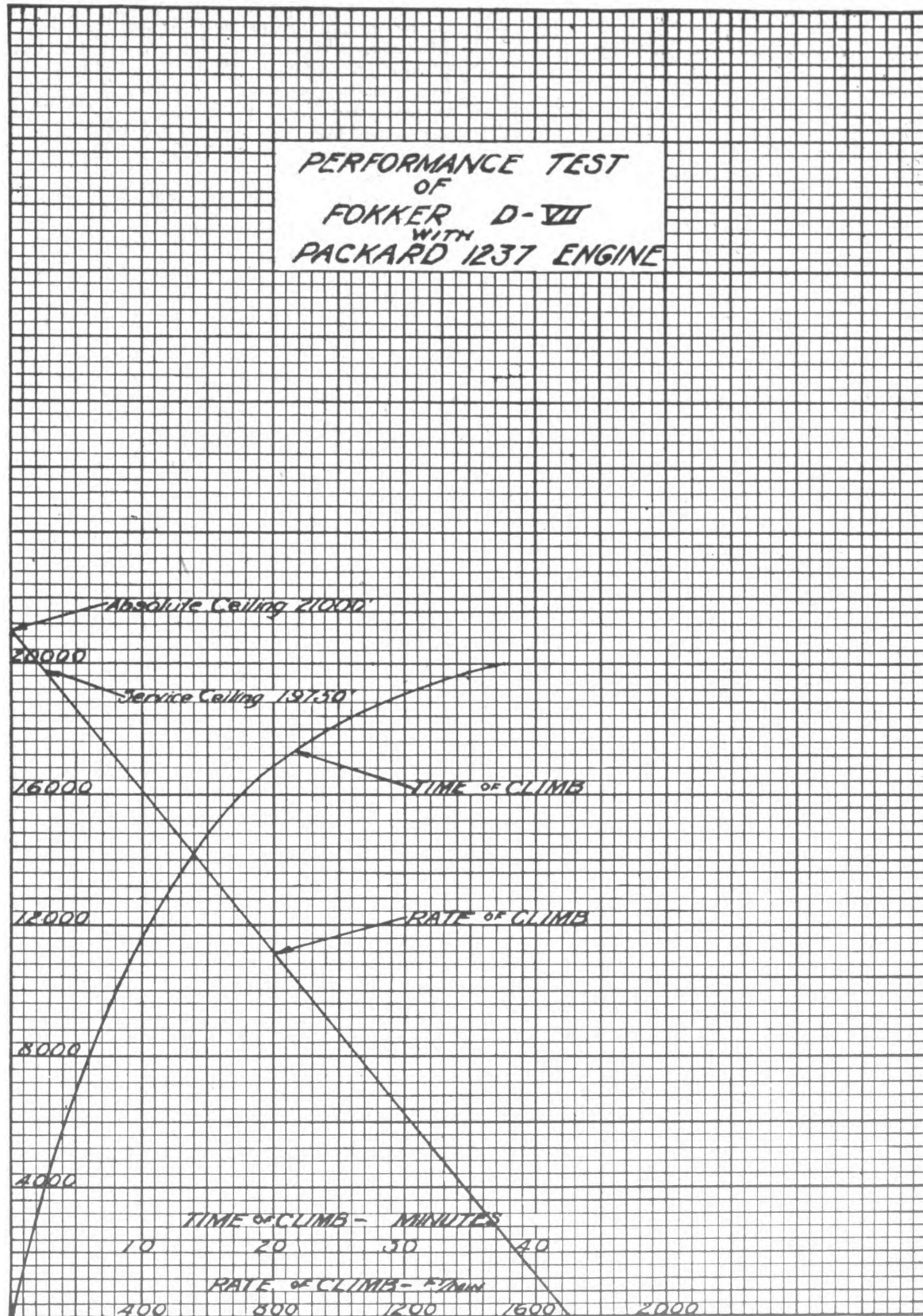


FIG. 1.

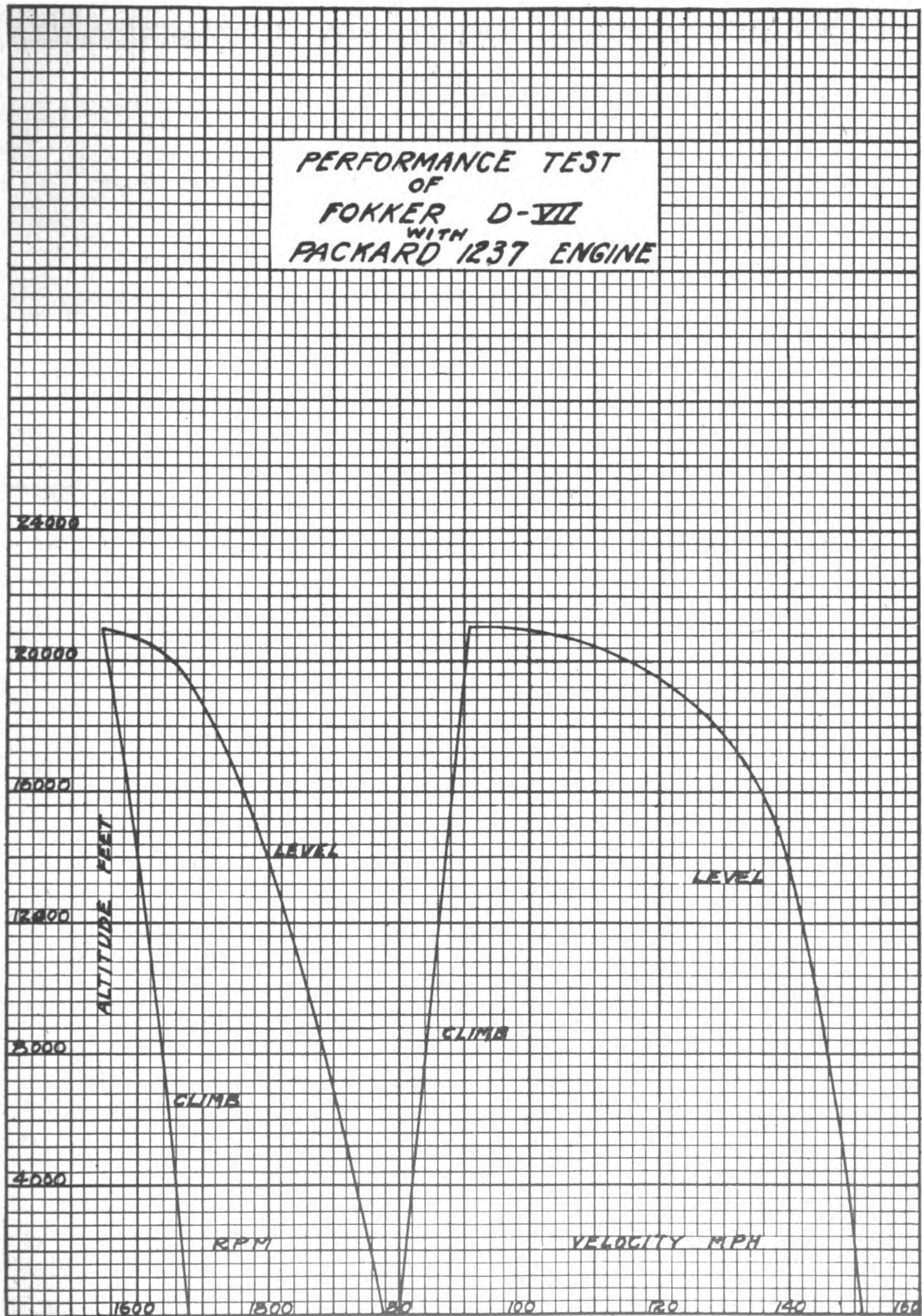


FIG. 2.



FIG. 3.



FIG. 4.



FIG. 5.